REMARKS

The Applicant thanks the Examiner for the Examiner's detailed comments in the office action mailed October 28, 2004 and for indicating that claims 3, 9-10, 13-14 and 17-18 would be allowable if rewritten in independent form.

The Applicant regrets that the initial wording of some of the claims required the Examiner to guess at the intended scope of the claims.

All of the original claims are now cancelled and are replaced by the attached new claims. Claims 24-41 are now pending in this application. Independent claim 24 is intended to broaden the scope of the broadest independent claim and to simplify the structure of the claim language. By electric machine it is meant any dynamo electric machine, which may be configured as a electro-mechanical drive for producing torque from electric power, a generator for producing electric power from mechanical rotation or both, for example, as is apparent from the language of the claims, themselves.

The intended scope of the claims is now apparent in the new claims, which are not indefinite under 35 U.S.C. §112. Claims 37-41 now recite a method of winding a main winding of an electric machine.

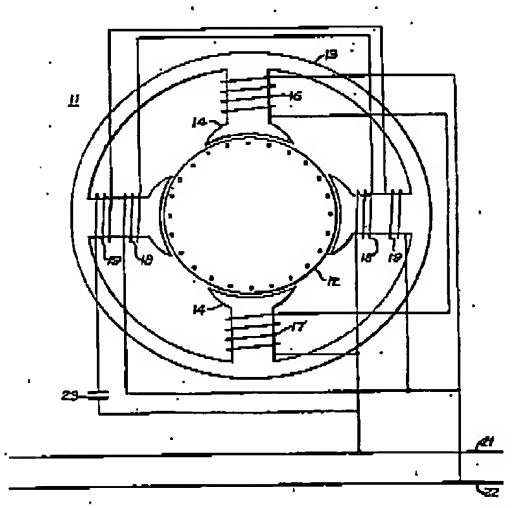
The Applicant respectfully traverses the rejection of the original claims and the replacement claims over either **Ross** (U.S. Pat. No. 1,916,389) and/or **Roberts** (U.S. Pat. No. 4,959,573) under 35 U.S.C. §102 and §103, respectively.

REJECTION UNDER 35 U.S.C. § 102

Ross fails to disclose "a plurality of main windings, each of the main windings having a first wire having a first wire size and a second wire having a second wire size," as recited in claim 1.

Ross merely serves as a reference describing a prior art, conventional single phase electric motor that uses capacitors to tune the "control" windings, physically displaced 90 degrees from the main windings.

As can be seen from Fig. 1 of **Ross**, the main winding 16,17 of **Ross** has only one wire. **Ross** discloses additional wires 18,19, but these wires are wound in windings that are displaced by 90 degrees from the main windings of the single phase motor of **Ross**. (See also col. 1, ll. 41-47). Thus, **Ross** discloses nothing about a main winding having two wires with different wire sizes or any coupling between two wires wound as a main winding. In order to anticipate a claim, a reference must disclose each and every element exactly. **Ross** fails to disclose each and every element of claim 1; therefore, **Ross** does not anticipate claim 1.



Ross Fig. 1 shows additional windings 18,19 displaced by 90 degrees from windings 16,17.

REJECTION UNDER 35 U.S.C. § 103

Roberts fails to teach or suggest "each of the first wires and the second wires being operatively coupled to each other and capable of being coupled to the external power source, such that a field resulting from current in the second wire is in an opposite phase relation to a field resulting from current in the first wire during operation of the electric machine..." and

"...at least one capacitor operatively coupled in series to the second wires," as recited in claim 1.

It is impossible to have an opposite phase relation between the windings of Roberts, because the primary winding is connected in series with the combination of an additional winding coupled in parallel with a capacitor.

In order to establish *prima facie* obviousness, a reference must teach or suggest every limitation of a claim. **Roberts** fails to teach or suggest every limitation of claim 1; therefore, **Roberts** fails to establish *prima facie* obviousness of claim 1.

ROBERTS TEACHES AWAY

Even if *prima facie* obviousness could be established, **Roberts** teaches away from the invention as claimed.

Roberts teaches in the Abstract and Summary of the Invention that the secondary winding is interleaved between the primary stators and is magnetically coupled to the primary stator windings but not directly connected to the power inputs. This means that the secondary winding is physically displaced between the main windings of the stators, adjacent to, but separate from, the main windings.

Furthermore, as shown in Fig. 10 and taught throughout **Roberts**, the "...capacitor is connected in parallel with one of the stator windings and this combination is connected in series with the other stator winding...." Thus, **Roberts** teaches that the secondary winding and capacitor must be connected in parallel and not in series. Specifically, it is instructive to compare **Roberts** Fig. 10 with Figs. 9 and 10 of the present application, which are provided on the next page for the convenience of the Examiner.

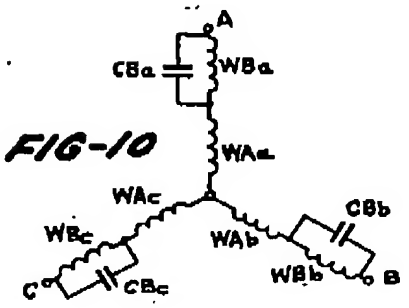


FIG-10

Roberts Fig. 10 showing series connection

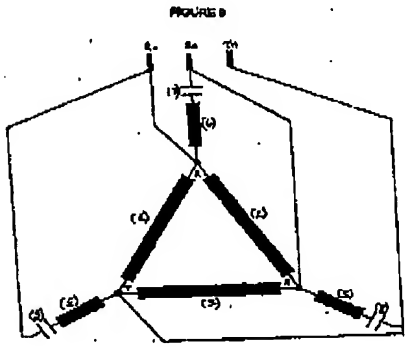


Fig. 9 of the present application.

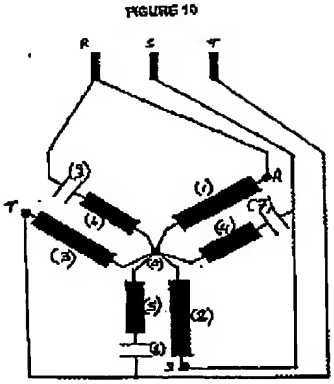


Fig. 10 of the present application

Fig. 10 of **Roberts** shows windings WBc and WAc. The capacitor CBc is shown to be in parallel with a secondary winding and not in series with any winding. In contrast, Fig. 9 of the present application shows an example of a capacitor 7,8,9 in series with a second wire 4,5,6 coupled electrically with a first wire 1,2,3 of each main winding of the stator and capable of being connected to an external power source. Likewise, the configuration of Fig. 10 of the present application shows another example of a capacitor 7,8,9 connected in series with the second wire 4,5,6. Both figures are examples of the invention recited in claim 1 and both stand in stark contrast to the teachings of **Roberts**.

Furthermore, the Background section of **Roberts** teaches away from any series configuration between a capacitor and a winding that could be configured to have an opposite

phase relation. Indeed, **Roberts** suggests that others have made attempts to create "a balanced condition by a series resonating winding in combination with a phase winding...." **Roberts** teaches that these attempts merely created a "tuned condition for a narrow spectrum only," and failed to increase efficiency significantly, because at certain load points circulating harmonic currents result in an efficiency "...reduced to below that of the standard design." *See* **Roberts** col. 1, line 61 to col. 2, line 22. The present invention solves the problems that **Roberts** suggests could not be solved by others, and application of the present invention is capable of saving energy during use of the electric motor over a full range of operating conditions compared to a conventional electric motor. **Roberts** represents the state of the art, and **Roberts** teaches away from a capacitor in series with a winding. Therefore, claim 1 is non-obvious over **Roberts**. In addition, there is no motivation to combine **Roberts** with any other reference, since **Roberts** teaches away from the invention as claimed.

DEPENDENT DEVICE CLAIMS

Claims 25-36 depend from claim 24, incorporating all of the limitations of claim 1 and additional limitations; therefore, claims 25-36 are neither anticipated by nor obvious over the references cited by the Examiner.

SUPPORT FOR DEVICE CLAIMS

Support for the pending device claims is found in the prior claims and the specification, as filed. The preamble of the claim identifies a state of the art, modified conventional motor. It is known to modify a conventional motor that does not save energy by incorporating capacitors and additional windings displaced circumferentially or both circumferentially and radially from a conventional main winding. A method of modifying a conventional motor to which the electric motor of the present invention is being compared is described in the present application as using a separation of conventional windings into two separate, displaced windings and using a series capacitor connected to one of the two windings. This series capacitor is conventionally selected to have a capacitance equal to the theoretically rated horsepower of the motor times the square of the constant base voltage times a factor of 1.5 divided by the square of the phase line voltage. Specifically, this energy-saving modification is disclosed in the present application in

paragraphs [0040] to [0050] and is shown in the drawings of Figs. 4-6, for example. In the Background, one reference discloses that the modification displaces the additional control windings both circumferentially and radially from the main windings.

In contrast, the pending claims recite coupling of two separate and distinct conductors into a single main winding such that the main winding and additional winding are in "opposite phase angles and opposite field directions from each other," as disclosed in paragraph [0008], for example. Each of the main windings may be wound with a conventional first conductor and an additional second conductor at the same time. See paragraphs [0009] and [0063], for example. The additional second conductor is operatively sized and coupled electrically with at least one capacitor, the first conductor and an external power source such that the "field resulting from current in the second is in an opposite direction to a field resulting from current in the first conductor during operation of the electric motor," as disclosed in paragraph [0011], for example. This causes the additional second conductor to be a de-saturation winding, as described in paragraph [0008], for example. Furthermore, the combined cross section of the first and second conductors may be selected, such that the total cross section is the same as the cross section for a conventional main winding, paragraph [0008], such that there is "no change in the copper density," paragraph [0060], and "no changes are required on the original type of winding layout, adjacent or consequent poles," paragraph [0062], compared to an unmodified, conventional electric motor that is not energy saving.

The two conductors of the modified, energy-saving main winding of the present invention are interconnected in opposite field directions and phase angles from each other, as disclosed in the drawings of Figs. 8-11 and paragraphs [0011], [0052], [0063]. [0065] and [0069], for example.

The cross sectional area of the wires that make up the conductor connected in series with a capacitor (second conductor) is disclosed as being less than the cross sectional area of the wires that make up the other conductor (first conductor) of the pair of conductors, such that ratios of cross sectional areas of each of the conductors to the total cross section of both of the

conductors is a predetermined ratio, as disclosed in paragraphs [0008] and [0061]. One example given is a ratio of about 1/3 for the cross sectional area of the second conductor to the total cross sectional area of both the first conductor and the second conductor, resulting in the "no change in copper density" of paragraph [0060], for example.

The conductor length (size) may be selected to give a length of the first conductor that is twice the length of the second conductor, as described in paragraphs [0013] and [0068], for example. Thus, in specific examples, the second conductor is described as having a length (size) one-half of the length (size) of the first conductor and a cross sectional area one-third of the sum of the cross sectional areas of both the first and second conductors.

SUPPORT FOR METHOD CLAIMS

Claims 37-41 recite method claims. A method comprising "...winding the first conductor and the second conductor simultaneously during at least a portion of the winding of the main winding...." is disclosed in paragraphs [0009] and [0063]. Selecting a first conductor size for a first conductor and a second conductor size for a second conductor, wherein the first conductor size is larger than the second conductor size, is disclosed in paragraphs [0008] and [0061]. Coupling "...the second conductor with a capacitor in series electrically..." is disclosed in Figures 8-11 and throughout the specification. Thus, all of the steps of claim 37 are fully supported. In addition, all of steps of the claims depending from claim 37 are disclosed in the specification and were previously recited in the cancelled claims.

Furthermore, the references cited neither anticipate nor establish *prima facie* obvious of the method claims. Specifically, the references cited do not disclose, teach or suggest a process comprising "...winding the first conductor and the second conductor simultaneously during at least a portion of the winding of the main winding...."

SUMMARY

All of the known ways of modifying a conventional electric motor to create an energy saving motor require significant modifications, such as displacement of the original winding

layout and addition of new "control" windings adjacent to the main windings and displaced circumferentially or both radially and circumferentially from the main windings. Consequently, the new control windings result in new poles that are physically displaced from the original poles and interact with the magnetic field of the main windings in a way other than in opposite phase relation. The present invention does not require any reengineering of a conventional motor. Instead, the main winding is separated into a first conductor and a second conductor, the second conductor being connected in series to a capacitor. By sizing the capacitor and the conductors correctly, energy savings are achieved compared to conventional motors and may be achieved even compared to other more complex, energy-saving motors that are much more costly to manufacture.

REQUEST FOR ENTRY OF AMENDMENTS

Cancellation of the previous claims and entry of the new claims is respectfully requested, which put the new claims in condition for allowance. No new matter has been added.

PAYMENT OF FEES

If any fee is required, please charge it to our Deposit Account 500864.